NON-PUBLIC?: N
ACCESSION #: 8804130091
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Beaver Valley Power Station Unit 2 PAGE: 1 of 4

DOCKET NUMBER: 05000412

TITLE: Reactor Trip Due to 100% Load Rejection Test
EVENT DATE: 10/24/87 LER #: 87-032-01 REPORT DATE: 11/23/87

LICENSEE CONTACT FOR THIS LER:
NAME: Thomas P. Noonan, Plant Manager TELEPHONE #: 412-643-1258

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: JD COMPONENT: XXXX MANUFACTURER: XXXX
REPORTABLE TO NPRDS: N
CAUSE: X SYSTEM: JE COMPONENT: XXXX MANUFACTURER: XXXX
REPORTABLE TO NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: On 10/24/87, the 100% Load Rejection Test (IST 2.04.06) was performed. The operators, as per procedure, manually opened the Main Output Breakers to initiate a loss of load transient. Condenser Steam Dumps automatically opened in response to the loss of load. The resultant steam flow transient caused all three Steam Generator levels to drop rapidly. A Reactor Trip occurred on Lo-Lo Steam Generator Level. All Auxiliary Feed Pumps auto-started to recover Steam Generator levels. Due to Turbine speed fluctuations, all three Reactor Coolant Pumps (RCPs) tripped on underfrequency. Thirty seconds after the Reactor Trip, station loads were (as designed) automatically transferred from onsite to offsite power. However, the "A", "B" and "AE" 4KV Busses did not successfully transfer due to phase differential between onsite and offsite power. The #1 Emergency Diesel Generator auto-started and reenergized the "AE" Bus. The "A" and "B" Busses were manually realigned to offsite power. The "A" RCP was restarted. Operators stabilized the plant using the Reactor Trip response procedure. There were no safety implications due to this event. This event was bounded by FSAR Section 15.2.6 (Reactor Trip from 100%, coincident with Loss of Off-Site Power).

(End of Abstract)

TEXT: PAGE: 2 of 4

On 10/24/87, the 100% Load Rejection Test (IST 2.04.06) was performed. The

operators, as per procedure, manually opened the Main Output Breakers to initiate the loss of load transient. The Condenser Steam Dumps' control circuitry sensed this load rejection and actuated the steam dumps. On a greater than 50% load rejection, all eighteen steam dump valves are armed and will actuate as required to maintain the average RCS Temperature with the programmed RCS temperature. On a less than 50% load rejection, only nine of the steam dump valves are armed and capable of actuating. The extent of the load rejection is determined by the change in High Pressure Turbine First Stage Impulse Pressure. During this test, a 100% Load Rejection was simulated by opening the Main Unit's Output Breakers. Once these breakers were opened, the Overspread Protection Control (OPC) signal actuated. The OPC signal cycled the Turbine governor and Interceptor Valves closed and open rapidly to interrupt steam flow from the High Pressure Turbine to the Low Pressure Turbine. By interrupting this steam flow, Turbine speed was controlled. However, this OPC also acted to maintain pressure in the High Pressure Turbine. With the elevated pressure in the High Pressure Turbine, all condenser dump valves did not open, decreasing steam flow. The Steam Flow decrease caused main Steam pressure to increase. This increase in Main Steam Pressure caused Steam Generator levels to "shrink". This resulted in an automatic Reactor Trip (approximately six seconds after initiation of the test) on Lo-Lo Steam Generator level. All Auxiliary Feed Pumps (two motor driven, one steam driven) auto-started, as per design, to recover Steam Generator levels.

As stated above, the speed of the main Unit Generator increased after being disconnected from the grid. The automatic control systems (both the OPC and the Turbine Electro-Hydraulic Control System) slowed the Generator/Turbine to maintain 60 Hertz. However, before stabilizing at 60 Hertz, the Generator's output undershot and dropped to the Reactor Coolant Pumps' (RCPs') underfrequency trip setpoint. All three RCP's tripped, as per design. The plant went into a natural circulation mode of heat removal.

Thirty seconds after the Reactor Trip, station loads were automatically transferred from onsite to offsite power. However, by this time, onsite power was no longer in-sync with grid power. This was due to the fact that during the thirty-six seconds between the initiation of the test and the attempted transfer, the Generator's output had not been maintained at a constant 60 Hertz. Due to this phase difference, the instantaneous voltage between offsite and onsite power were not matched. This difference caused the "A" and "B" Busses to trip on overcurrent/undervoltage when they tried to transfer. The "AE" 4KV Bus (the "A" Train Emergency 4KV Bus), which is normally powered from the "A" 4KV Bus, was also deenergized. The #1 Diesel Generator automatically started and reenergized the "AE" 4KV Bus. Operators manually realigned the "A" and "B" Busses to offsite power. Operators

manually realigned the "AE" Bus to be powered off the "A" Bus. The #1 Diesel Generator was shut down and returned to standby. Operators manually restarted the "A" RCP to restore forced flow through the Reactor Coolant System.

The cause of this event was the elevated pressure in the High Pressure Turbine. Due to this high pressure, all steam dumps did not operate, thus causing high Steam Pressure. This Steam Pressure caused the Steam Generator levels to shrink. Westinghouse was consulted in order to determine the cause of the elevated pressure in the High Pressure Turbine. As per their evaluation, the High Pressure Turbine pressure response was due to a combination of the following:

1. The OPC actuation interrupted the normal flow path for steam leaving the Turbine, and

2. The Feedwater Second Point Heaters had been isolated during this test. The test had not addressed the configuration of the feedwater heaters. The station had chosen to isolate these heaters during initial startup and power escalation due to operational concerns. While OPC is actuating, these heaters serve as a drain path for steam in the High Pressure Turbine.

Based on the above evaluation, no additional corrective actions are required for this event. The 100% Load Rejection Test was a one time only test and will not be performed in the future. In the event of an actual 100% or near 100% load rejection, an OPC actuation is not expected, as the generator will not be disconnected from the grid and will control turbine speed. Additionally, under the normal system arrangement, the Second Point Heaters are in-service and capable of serving as a steam drain for the High Pressure Turbine.

There were no safety implications due to this event. All ESF equipment functioned as per design as detailed above. This event was within the bounds of the Station's Safety Analysis (FSAR Section 15.2.6, Reactor Trip from 100% Power, Coincident with Loss of Offsite Power).

AT
ACHMENT # 1 TO ANO # 8804130091 PAGE: 1 of 2

Duquesne Light Telephone (412) 393-6000
Nuclear Division
P.O. Box 4
Shippingport, PA 15077-0004

April 4, 1988
ND3SPM:0195

Beaver Valley Power Station, Unit No. 2
Docket No. 50-412, License No. NPF-73
LER 87-032-01

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Gentlemen:

In accordance with Appendix A, Beaver Valley Technical Specifications, the following revised Licensee Event Report is submitted:

LER 87-032-01, 10 CFR 50.73.a.2.iv, "Reactor Trip Due to 100% Load Rejection Test".

Very truly yours,
/s/ T. P. Noonan
T. P. Noonan
Plant Manager

tlu
Attachment

ATTACHMENT # 1 TO ANO # 8804130091 PAGE: 2 of 2

April 4, 1987
ND3SPM:0195
Page two

cc: Mr. William T. Russell
Regional Administrator
United States Nuclear Regulatory Commission
Region 1
King of Prussia, PA 19406

C. A. Roteck, Ohio Edison

Mr. Peter Tam, BVPS Licensing Project Manager
United States Nuclear Regulatory Commission
Washington, DC 20555

J. Beall, Nuclear Regulatory Commission,

BVPS Senior Resident Inspector

Mr. Alex Timme, CAPCO Nuclear Projects Coordinator
Toledo Edison

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, GA 30339

G. E. Muckle, Factory Mutual Engineering, Pittsburgh

Mr. J. N. Steinmetz, Operating Plant Projects Manager
Mid Atlantic Area
Westinghouse Electric Corporation
Energy Systems Service Division
Box 355
Pittsburgh, PA 15230

American Nuclear Insurers
c/o Dottie Sherman, ANI Library
The Exchange Suite 245
270 Farmington Avenue
Farmington, CT 06032

Mr. Richard Janati
Department of Environmental Resources
P.O. Box 2063
16th Floor, Fulton Building
Harrisburg, PA 17120

*** END OF DOCUMENT ***